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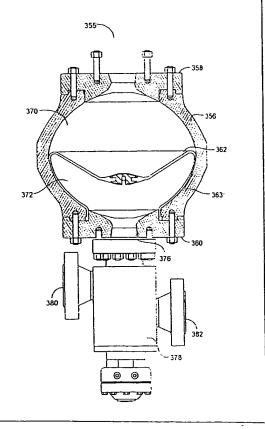
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(54) Title: SUBSEA MUD PUMP

(57) Abstract

A positive-displacement pump (102) includes multiple pumping elements (355, 356). Each pumping element having a pressure vessel (356) with a first (372) and a second (370) chamber and a separating member (362) disposed between the first (372) and second (370) chambers. The first (372) chambers and the second (370) chambers are hydraulically connected to receive and discharge fluid, wherein the separating members (362) move within the pressure vessels (356) in response to pressure differential between the first (372) and second (370) chambers. A valve assembly (378) having suction (380) and discharge (382) valves communicates with the first (372) chambers. The suction (380) and discharge (382) valves are operable to permit fluid to alternately flow into and out of the first (372) chambers. A hydraulic drive (420) alternately supplies hydraulic fluid to and withdraws hydraulic fluid from the second (370) chambers such that the fluid discharged from the first (372) chambers is free of pulsation.



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INTERNATIONAL SEARCH REPORT

International application No. PCT/US99/06111

A. CLAS	SSIFICATION OF SUBJECT MATTER						
	F04B 17/00, 35/02, 43/10; E21B 15/02.						
	417/395, 390, 521; 137/596.17; 251/129.07, 324, 2						
	According to International Patent Classification (IPC) or to both national classification and IPC						
	DS SEARCHED	A. d. 18 d. a. d. L. L.					
	ocumentation searched (classification system followed	•					
U.S. : 4	417/390, 392, 395, 401, 505, 521, 533; 137/596.17;	251/129.07, 324, 282.					
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched							
	lata base consulted during the international search (na e Extra Sheet.	me of data base and, where practicable	e, search terms used)				
c. Doc	UMENTS CONSIDERED TO BE RELEVANT						
Category*	Citation of document, with indication, where ap	propriate, of the relevant passages	Relevant to claim No.				
Х	US 2,703,055 A (Veth et al.) 01 March lines 34-42 and col. 4, lines 58-70; get		1-2, 4-8, 11-13				
х	US 4,755,111 A (Cocchi et al.) 05 July lines 20-21; generally see all.	1-2, 4, 8, 11					
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X Fun	her documents are listed in the continuation of Box C	See patent family annex.					
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INTERNATIONAL SEARCH REPORT

International application No. PCT/US99/06111

Catagorit	Citation of document with indication where commists of the salarant account	Relevant to claim No.
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Resevant to claim 140.
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x	US 5,480,292 A (Chevallier) 02 January 1996, see generally all.	1-2
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International application No. PCT/US99/06111

B. FIELDS SEARCHED Electronic data bases consulted (Name of data base and where practicable terms used):					
APS, EAST. search terms: pump, diaphragm, piston, hydraulic, subsea, mud, fluid, liquid, pulse, pulsation, reduce, valve, booster, positive, displacement, control, reverse flow, actuator, pressure, plunger, ribs, position, locatior, pressure senor.					
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